COLLECTION OF MUNICIPAL REFUSE.

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Read before the Sanitary Engineering Section, American Public Health Association, Washington, D. C. September, 1912.

The collection of muncipal refuse is one of the most important parts of the general problem of refuse disposal and should be so considered, instead of as a problem by itself. It affects a larger proportion of the population more directly than do the works for the final disposition of the refuse, and the cost of collection is frequently more than the cost of the final disposition. The financial aspect of collection is often looked upon as the most important, and while it is of great importance, still, due consideration should be given to the sanitary and æsthetic sides of the question. The relative importance of each will depend upon local conditions.

The treatment of the refuse at the house should, first of all, be consistent with cleanliness, as nuisances in yards and alleys may affect more people than either the collection or the disposal of the refuse. It should be simple and easy of adoption and should favorably affect the cleanliness and economy of the collection system.

There are advantages in having a standard type or types of receptacle for an entire city, the number of types depending of course on the nature of the collection, whether separate or combined, but this is not essential. The receptacle should, however, be of durable material, should have a tight fitting cover, and, in general, its weight, when full, should not be greater than that which can be handled by one man. If receptacles holding garbage or other refuse containing a large amount of water are kept in covered, lined pits below the surface of the ground, their contents are not likely to freeze in winter. There is a further advantage with this arrangement in that the collector can find the receptacle quickly and easily. Again, there is less chance of the receptacle being stolen. With night collection, on the other hand, it may be found desirable to have the receptacles placed at the street line.

At Minneapolis, Minn., it is said that the wrapping of garbage in paper prevents objectionable odor, keeps away the flies, and in winter prevents the garbage from freezing and adhering to the receptacle.

The frequency with which refuse is collected will depend on local conditions, character of refuse, climate, and method of collection, and will often vary with the season. In any event the refuse should be removed from the premises before it accumulates to the extent of becoming a nuisance.

In some American cities, especially in the congested portions, garbage is removed daily. At Columbus, Ohio, it is collected twice a week in summer and once a week in winter, and at Minneapolis, where the garbage is wrapped in paper, once a week at all times of the year has been found sufficient. In Boston, Mass., and Rochester, N. Y., ashes are collected once a week, and in the cities in England and on the Continent, where the garbage, ashes and rubbish are collected together, collections are, in general, made three times a week.

The length of haul depends on many factors, important among which may be mentioned the topography of the city and the location of the disposal works. At Columbus the long and short haul system has been adopted each team traveling the same total distance each day, about sixteen miles. In other cities, among which are Atlanta, Ga., and Seattle, Wash., it is being found desirable to provide loading stations throughout the city, to which the refuse is delivered by the collecting wagons and from which larger vehicles transport it to the point of disposal.

The question of collecting refuse at night instead of during the day should also receive consideration. Its advisability depends largely on local conditions and may vary even in different sections of the same city. In Milwaukee, Wis., it was adopted in order to lessen the nuisance from odor and dust. In Cologne, Germany, it has been abandoned because of the noise made by the wagons during the hours when people wished to sleep.

The relative merits of the separate collection of each class of refuse or the combined collection of all classes, *i.e.*, ashes, garbage and rubbish, should receive careful consideration, but the system to be adopted must, of necessity, depend on the method of ultimate disposal.

The separate collection is now in use in many American cities, particularly at those places where the garbage is disposed of by the reduction method, and in some cities, where there is a large foreign element in the population, it has been found difficult to get a complete separation of the several classes of refuse. Separate collection will be found in many instances to be less convenient at the house, more complicated and more expensive than the combined collection.

The combined collection of all classes of refuse will usually prove to be cleaner and to have fewer objectionable features, and with this system it should be easier to secure and keep a better grade of employees. The mixing of garbage with the rubbish and ashes will prevent, in a large measure, the blowing around of the latter, will lessen the dust nuisance, and indirectly may lessen the cost of street cleaning. The decomposition of the garbage is far less noticeable and, from the point of view of preventing a nuisance, the receptacles and wagons will not require such frequent cleaning nor would it be necessary to collect the refuse at such frequent intervals.

The fly nuisance is also reduced to a minimum and there is less likelihood of odors if the refuse is stored pending its final disposition. As but one type of wagon is required the system is probably easier to adopt and easier to enforce, fewer regulations being necessary. On the other hand, its adoption may in certain cases increase the cost of ultimate disposal. Where the refuse is incinerated, for example, it may be more expensive to burn all the ashes with the garbage and rubbish than simply to burn the garbage and rubbish with enough ashes to produce proper incineration, and dispose of the remaining ashes otherwise. The combined collection is now in use at Seattle, Wash., West New Brighton, New York City, and Atlanta, Ga., as well as in other American cities.

It is possible that it may be found advantageous, in some cities, to adopt the combined system of collection in certain districts and the separate collection in other districts, depending, of course, on local conditions.

The type of vehicle best suited for collecting refuse depends on the method of collection and other factors. Consideration should be given to ease of loading, emptying and cleaning, to provision against leakage, dust, odor and general unsightly appearance, to the question of noise during loading and when in motion, and to durability, first cost and cost of maintenance. The capacity of the vehicle is influenced by the length of haul, the frequency of collection and the topography. The garbage wagons at Columbus and Minneapolis hold 1.3 and 2 tons, respectively. At Seattle, where ashes, rubbish and garbage are collected together, the new wagons hold five tons. Properly arranged canvas covers have been found, in some cases, to have advantages over covers of wood or metal.

In New York City, where refuse is collected separately, a new type of collection vehicle is now being tested. The body is swung low on the running gear, with dumping ledges three feet six inches above the pavement, and is pivoted at one end to facilitate dumping. It holds nine cubic yards and is divided by a cross partition into two compartments, one for ashes and one for garbage. The relative capacity of the two compartments can be varied, by shifting the partition, to meet the seasonal variations in the quantity of each class of refuse.

At Zurich, Switzerland, the collection vehicle consists of three large, covered boxes set on a common running gear. After filling, the wagon is hauled to the incinerator where the boxes are lifted by a crane onto the automatic charging apparatus, the refuse dropping through the bottoms of the boxes into the furnace. By this arrangement the refuse is not exposed after it has been dumped out of the house receptacle and into the boxes of the collection vehicle. In Hamburg, Germany, electrically operated automobile trucks have been in use for a number of years. They cost about $3,800 each, weigh 11,000 pounds and hold three tons. Each truck is operated by two 4½-H.P. electric motors, the storage batteries

being recharged every day. One truck averages four trips in eight hours and covers a total distance of about thirty-five miles. The operation is very simple, one man being necessary to run the wagon and make the collections. The body is separate from the truck and, when full, is lifted by a crane at the incinerator and emptied into the storage bins. The cost of operating these trucks, exclusive of labor, superintendence and fixed charges, is given as $9\frac{1}{4}$ cents per mile or 27 cents a ton, a little less than half of the total being for tires.

Motor trucks for refuse collection are also being used in the United States. In Atlanta, Ga., for example, gasoline driven trucks, holding $1\frac{1}{2}$ and 3 tons each, have been employed for more than a year. The chassis costs $3,750 and the body of the wagon about $100. These trucks have proved very satisfactory, making six to eight trips a day and covering twenty-five miles. Each truck has a driver and two helpers, the former receiving $16 and the latter $9 each per week. At Seattle, 5-ton gasoline-driven trucks are being used with success to haul refuse from the loading stations to the point of disposal.

Information of value relative to the cost of collecting refuse is not easily obtainable, one of the reasons being that distinction is seldom made between the cost of collection and the cost of disposal. This is unfortunate, because the cost of collecting refuse is a very large part, estimated at 85 percent. in Seattle, of the total cost of collection and disposal. Cost data should be complete and due allownace should be made for proper interest charges on all capital outlay for equipment and other items.

The cost of combined collection at Seattle varies from $1.84 to $2.84 per ton, exclusive of superintendence and fixed charges. Superintendence amounts to 15c per ton. The net cost of incineration of the refuse is reported as only 52c to 70c per ton.

In Columbus, the cost of labor, equipment, repairs, inspection and superintendence for the collection of garbage amounts to $1.60 per ton, which, with fixed charges of 50c per ton, make the total cost of collection $2.10 per ton. The cost of collecting rubbish, exclusive of fixed charges, is reported as 54c per cubic yard, or, on the basis of 250 pounds per cubic yard, $4.32 per ton.

In Boston, Mass., in 1907, the cost of collecting ashes by the city is reported as $2.30 per ton-mile, exclusive of fixed charges, and for collecting garbage $2.18 per ton-mile.

The cost of collecting garbage in Minneapolis is said to be about $1 per ton, and in Atlanta the cost of collecting mixed refuse is estimated at $1.12 per ton. Pittsburgh spends $3 a ton for collecting and disposing of its rubbish and pays a contractor $2.25 per ton for collecting and removing its garbage.

The cost data cited give a general idea of the expense of collecting refuse

in several cities, but without an accurate knowledge of local conditions they cannot be safely used as a basis for estimates in other municipalities.

City ordinances and regulations relating to the collecting of refuse should be definite and consistent with each other, and there should be no uncertainty as to which department of the municipal government is responsible for their enforcement. A point of considerable importance and one which should be made clear in the city ordinances, is whether the occupants of property, or the property owners, shall be held responsible for the proper treatment of the refuse at the house.

As a general rule, the best results may be expected from municipal ownership and operation of the collection equipment. If the work is done by contract the regulations regarding collection should be strict and well enforced. In any case the collectors should be well-paid men who will take some interest in their work and, where possible, one man should always have the same route, so that he will become acquainted with the district and the house holders.

It will often be found advantageous, especially at first, to have district foremen whose duty shall be to inform the residents regarding the municipal ordinances and regulations and to generally improve the service.